same world

SUSTAINAIBILITY
AWARENESS
MOBILIZATION
ENVIRONMENT

in the Global Education
for the Eyd 2015

International conference, seminar and project meeting in Estonia, Tartu and Alatskivi, 26.-27.Oct 2016

The double challenge of climate change after the Paris Agreement

Stefano Caserini

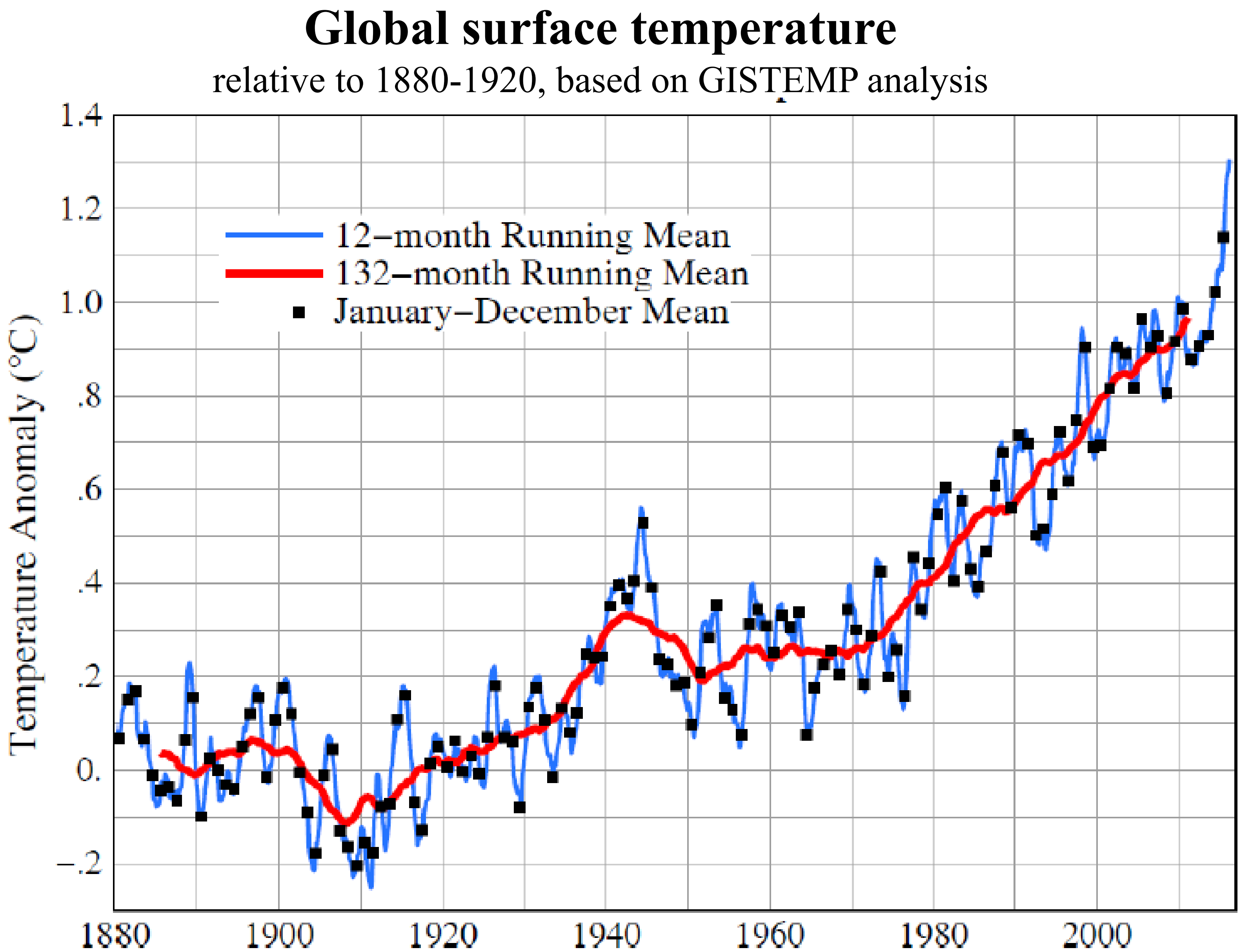
Politecnico di Milano, D.I.C.A. sez. Ambientale

stefano.caserini@polimi.it   *www.climalteranti.it*   *www.caserinik.it*   *@Caserinik*

Outline

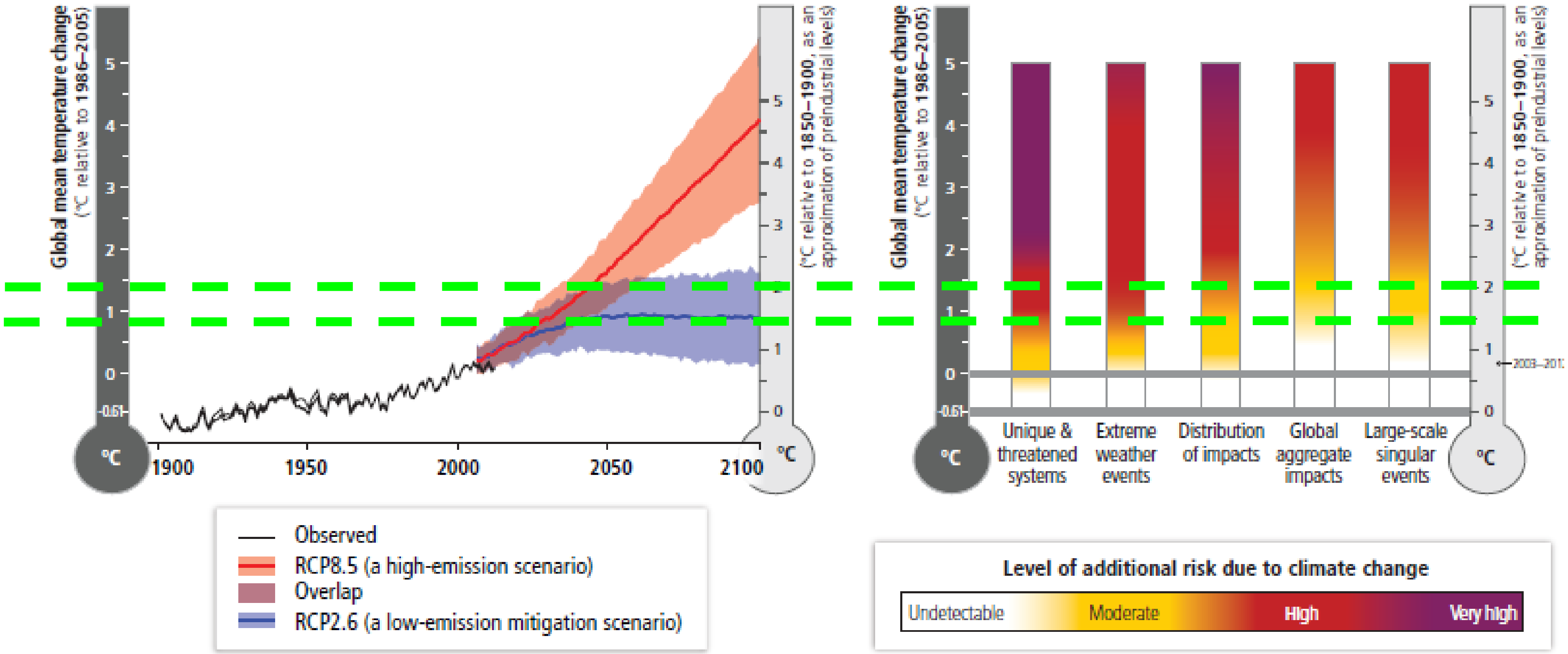
- What global warming really means
- The double challenge
- Some good news
- The Paris Agreement
- The road ahead

What global warming really means



Source: http://www.columbia.edu/~jeh1/mailings/2016/20160926_BetterGraph.pdf

Global perspective on climate-related risks. Risks associated with reasons for concern are shown at right for increasing levels of climate change.



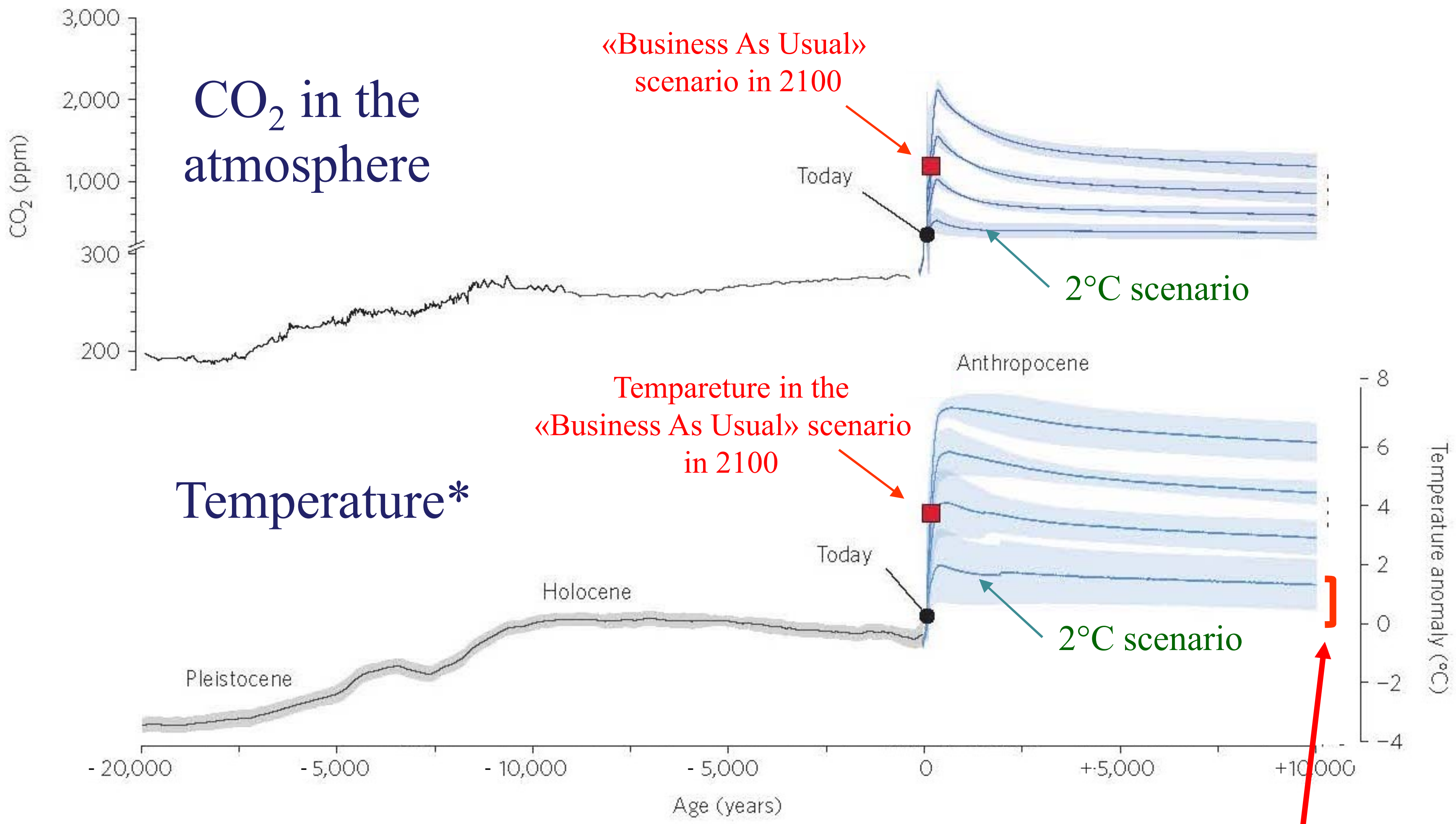
Source: IPCC – Fifth Assessment Report (AR5), 2013, WG2, Box TS.5 Figure 1

PERSPECTIVE
PUBLISHED ONLINE: 8 FEBRUARY 2016 | DOI: 10.1038/NCLIMATE2923
nature climate change

Consequences of twenty-first-century policy for multi-millennial climate and sea-level change

Peter U. Clark[1*], Jeremy D. Shakun[2], Shaun A. Marcott[3], Alan C. Mix[1], Michael Eby[4,5], Scott Kulp[6], Anders Levermann[7,8,9], Glenn A. Milne[10], Patrik L. Pfister[11], Benjamin D. Santer[12], Daniel P. Schrag[13], Susan Solomon[14], Thomas F. Stocker[11,15], Benjamin H. Strauss[6], Andrew J. Weaver[4], Ricarda Winkelmann[7], David Archer[16], Edouard Bard[17], Aaron Goldner[18], Kurt Lambeck[19,20], Raymond T. Pierrehumbert[21] and Gian-Kasper Plattner[11]

…policy decisions made in the next few years to decades will have profound impacts on global climate, ecosystems and human societies — not just for this century, but for the next ten millennia and beyond.

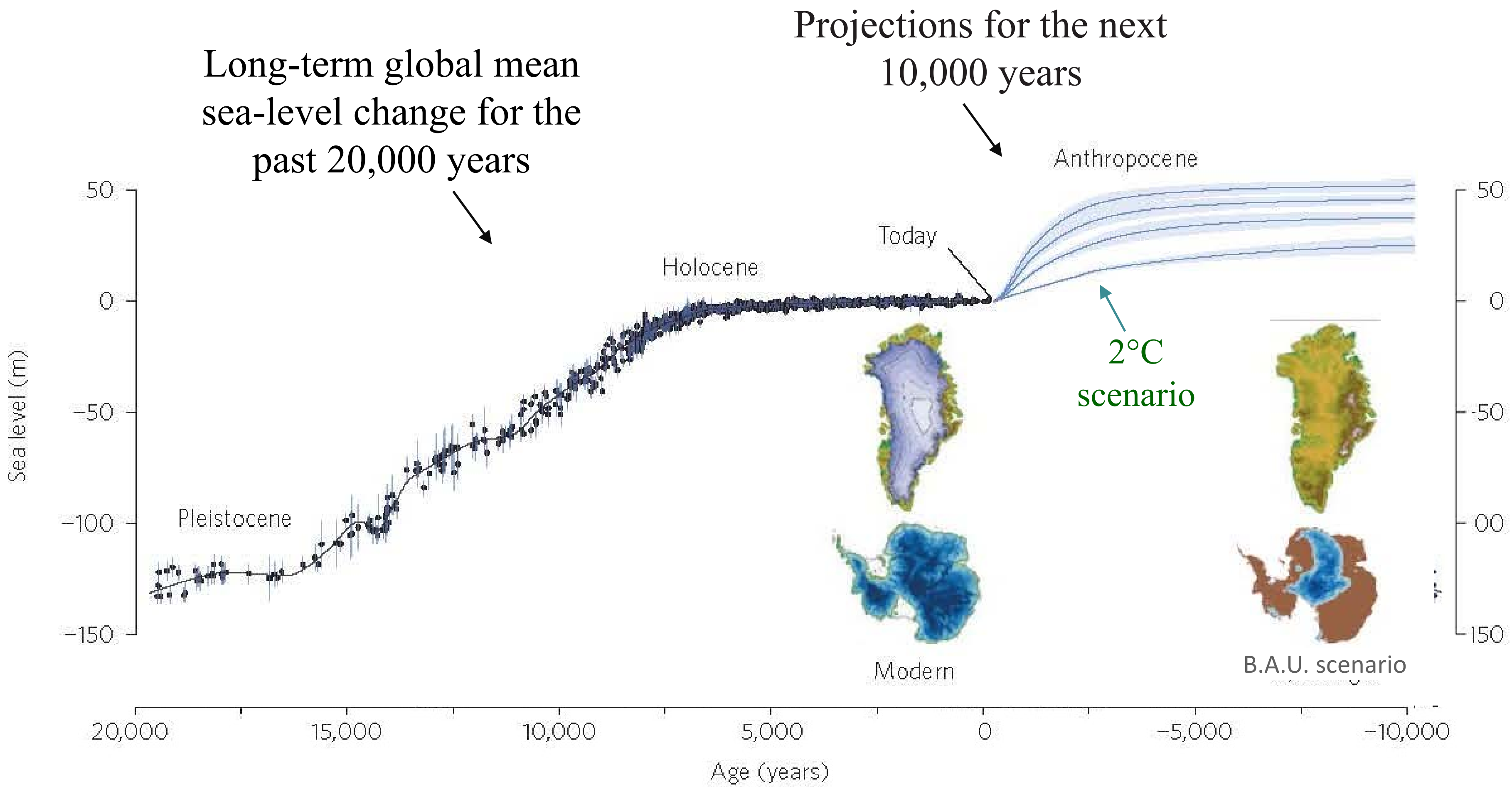


Anthropogenic increases in CO_2 have effects that extend well beyond 2100.
The long residence time of an anthropogenic CO_2 perturbation in the atmosphere, combined with the inertia of the climate system, implies that past, current, and future emissions commit the planet to long-term, irreversible climate change

* Temperature anomalies are relative to the 1980–2004 mean

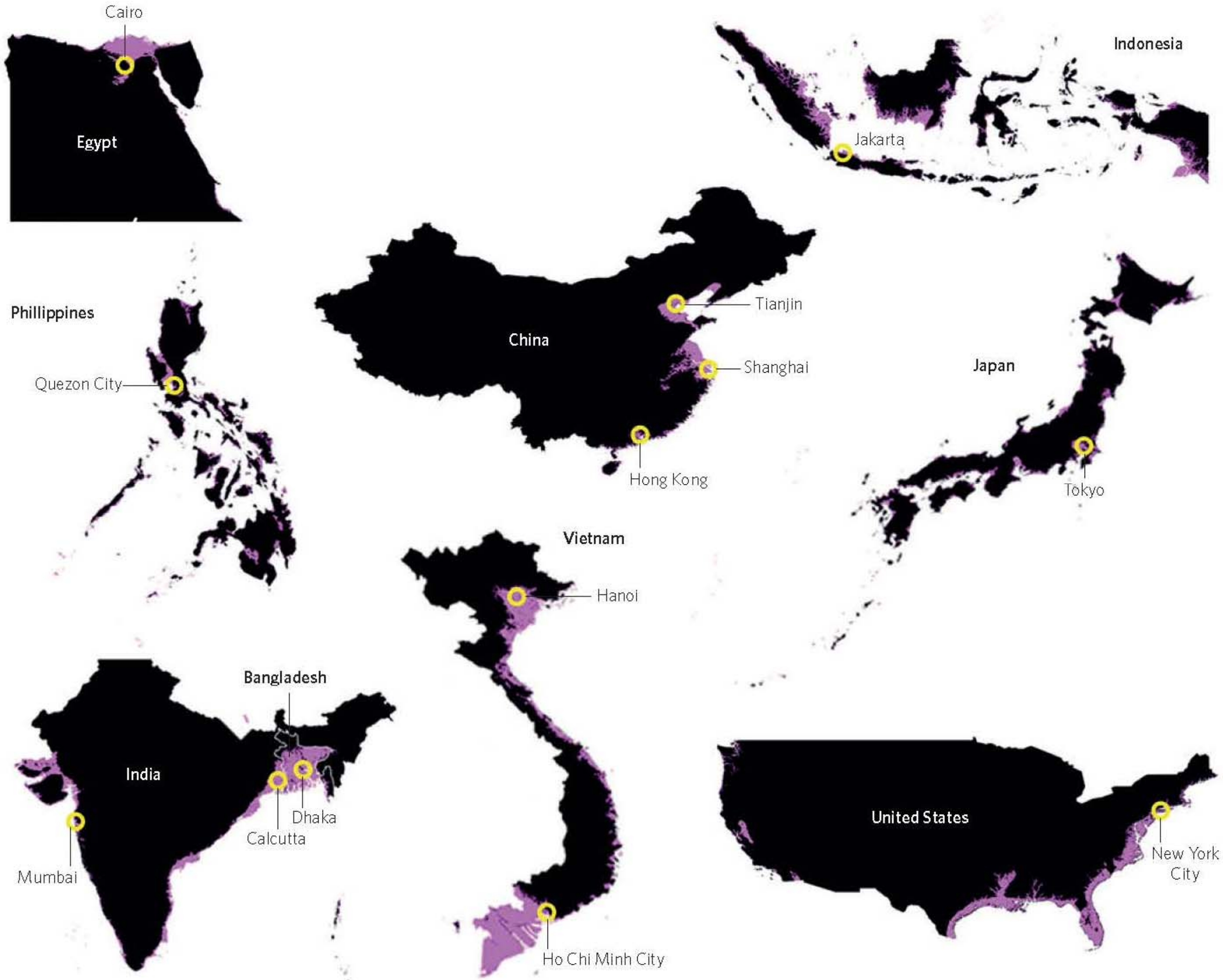
Source: adapted from Clark et al., 2016

Past and future changes in global mean sea level



Source: adapted from Clark et al., 2016

Projected submerged areas in heavily populated areas affected by sea-level rise



Source: Clark et al., 2016 Consequences of twenty-first-century policy for multi-millennial climate and sea-level change. Nature Climate Change, 6, 360-369

ARTICLE

doi:10.1038/nature17145

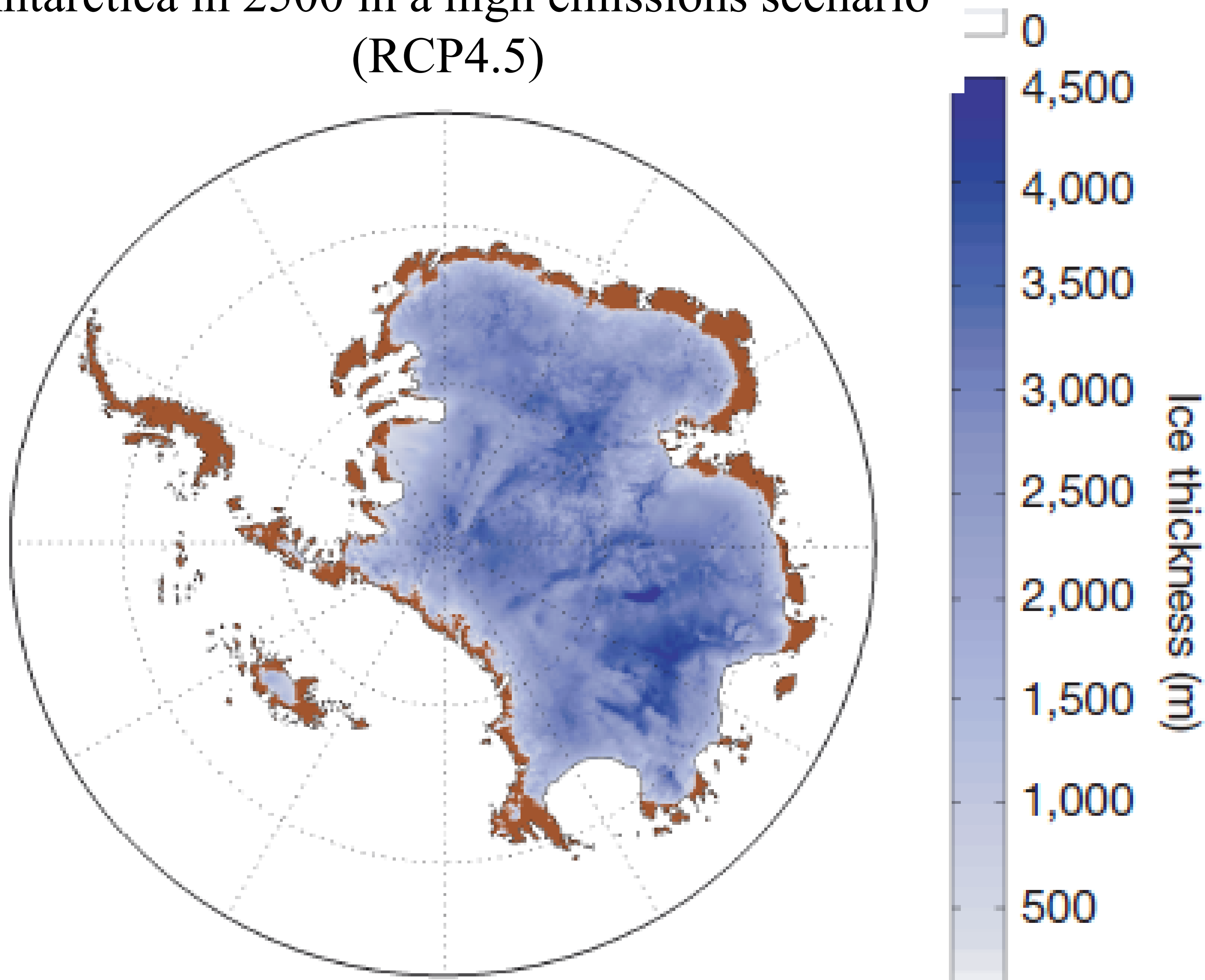
Contribution of Antarctica to past and future sea-level rise

Robert M. DeConto[1] & David Pollard[2]

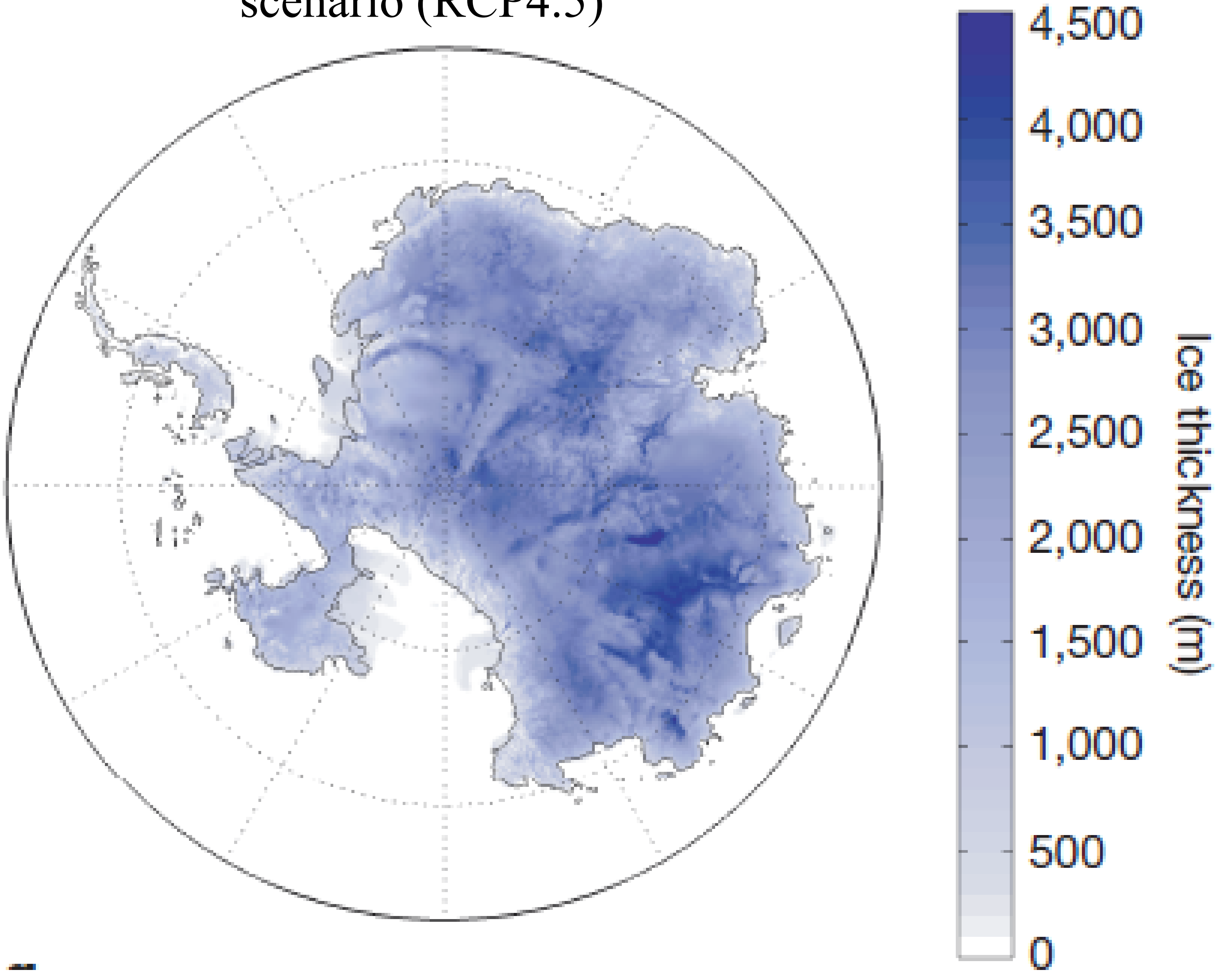
Polar temperatures over the last several million years have, at times, been slightly warmer than today, yet global mean sea level has been 6–9 metres higher as recently as the Last Interglacial (130,000 to 115,000 years ago) and possibly higher during the Pliocene epoch (about three million years ago). In both cases the Antarctic ice sheet has been implicated as the primary contributor, hinting at its future vulnerability. Here we use a model coupling ice sheet and climate dynamics—including previously underappreciated processes linking atmospheric warming with hydrofracturing of buttressing ice shelves and structural collapse of marine-terminating ice cliffs—that is calibrated against Pliocene and Last Interglacial sea-level estimates and applied to future greenhouse gas emission scenarios. Antarctica has the potential to contribute more than a metre of sea-level rise by 2100 and more than 15 metres by 2500, if emissions continue unabated. In this case atmospheric warming will soon become the dominant driver of ice loss, but prolonged ocean warming will delay its recovery for thousands of years.

"Antarctica has the potential to contribute more than a metre of sea-level rise by 2100 and more than 15 metres by 2500, if emissions continue unabated"

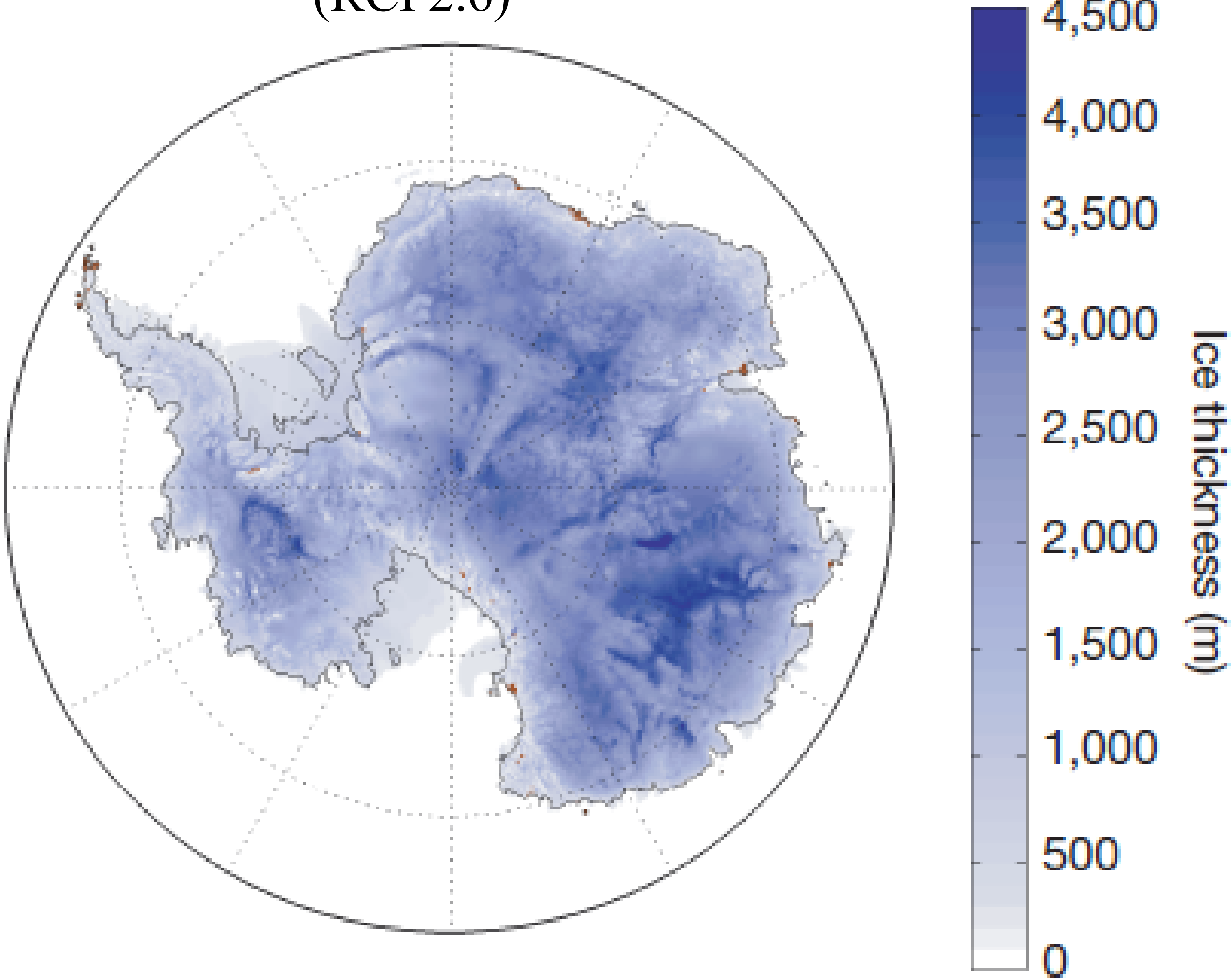
Antarctica in 2500 in a high emissions scenario (RCP4.5)



Antarctica in 2500 in a medium emissions scenario (RCP4.5)

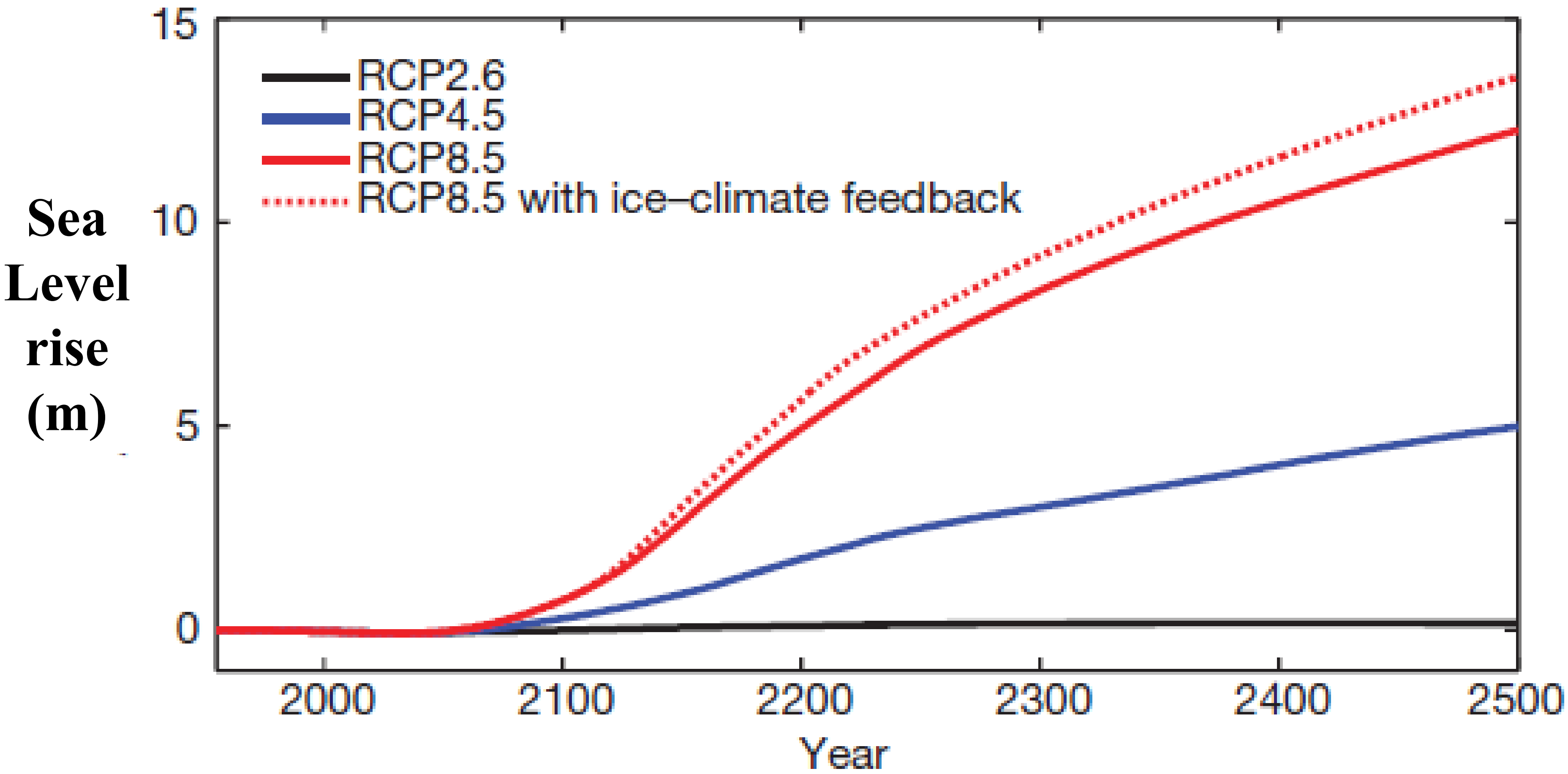


Antarctica in 2500 in a low emissions scenario (RCP2.6)



Projection of future Antarctic contributions to global mean sea level rise from 1950 to 2500

driven by a high-resolution atmospheric model and 1° NCAR CCSM4 ocean temperatures



NEWS IN FOCUS

Recent studies suggest that the Antarctic ice sheet is much less stable than scientists once thought.

CLIMATE

Trigger seen for Antarctic collapse

Continued growth of greenhouse-gas emissions this century could raise sea levels more than 15 metres by 2500.

The good news, is that it projects little or no sea-level rise from Antarctic melt if greenhouse-gas emissions are reduced quickly enough to limit the average global temperature rise to about 2 °C

www.nature.com/news/antarctic-model-raises-prospect-of-unstoppable-ice-collapse-1.19638


BEN&JERRY'S
QUAND C'EST FONDU,
C'EST FOUTU !
GREEN


PLUS TARD
CE SERA TROP TARD.
#COP21PARIS
PARIS2015

The double challenge

CHALLENGE 1: MITIGATION

In order to stabilize GHGs concentrations in the atmosphere, **emissions would need to peak and decline thereafter, <u>very soon,</u>**

Mitigation efforts over the **next decade** will have a large impact on opportunities to achieve lower stabilization levels.

CHALLENGE 2: ADAPTATION

Even if policies and efforts to reduce emissions prove effective, **some climate change is inevitable**; therefore, **strategies and actions to adapt** to its impacts are also **needed.**

The size of the challenge

- Immediate action is needed
- Global measures are needed – we have a small window of opportunity
- More than three quarter of fossil fuel reserves should remain unused
- We also need negative emissions

McGlade & Ekins (2015) The geographical distribution of fossil fuels unused when limiting global warming to 2°C. Nature, 187-190

Table 1 | Regional distribution of reserves unburnable before 2050 for the 2°C with CCS

Country or region	2 °C with CCS					
	Oil		Gas		Coal	
	Billions of barrels	%	Trillions of cubic metres	%	Gt	%
Africa	23	21%	4.4	33%	28	85%
Canada	39	74%	0.3	24%	5.0	75%
China and India	9	25%	2.9	63%	180	66%
FSU	27	18%	31	50%	203	94%
CSA	58	39%	4.8	53%	8	51%
Europe	5.0	20%	0.6	11%	65	78%
Middle East	263	38%	46	61%	3.4	99%
OECD Pacific	2.1	37%	2.2	56%	83	93%
ODA	2.0	9%	2.2	24%	10	34%
United States of America	2.8	6%	0.3	4%	235	92%
Global	431	33%	95	49%	819	82%

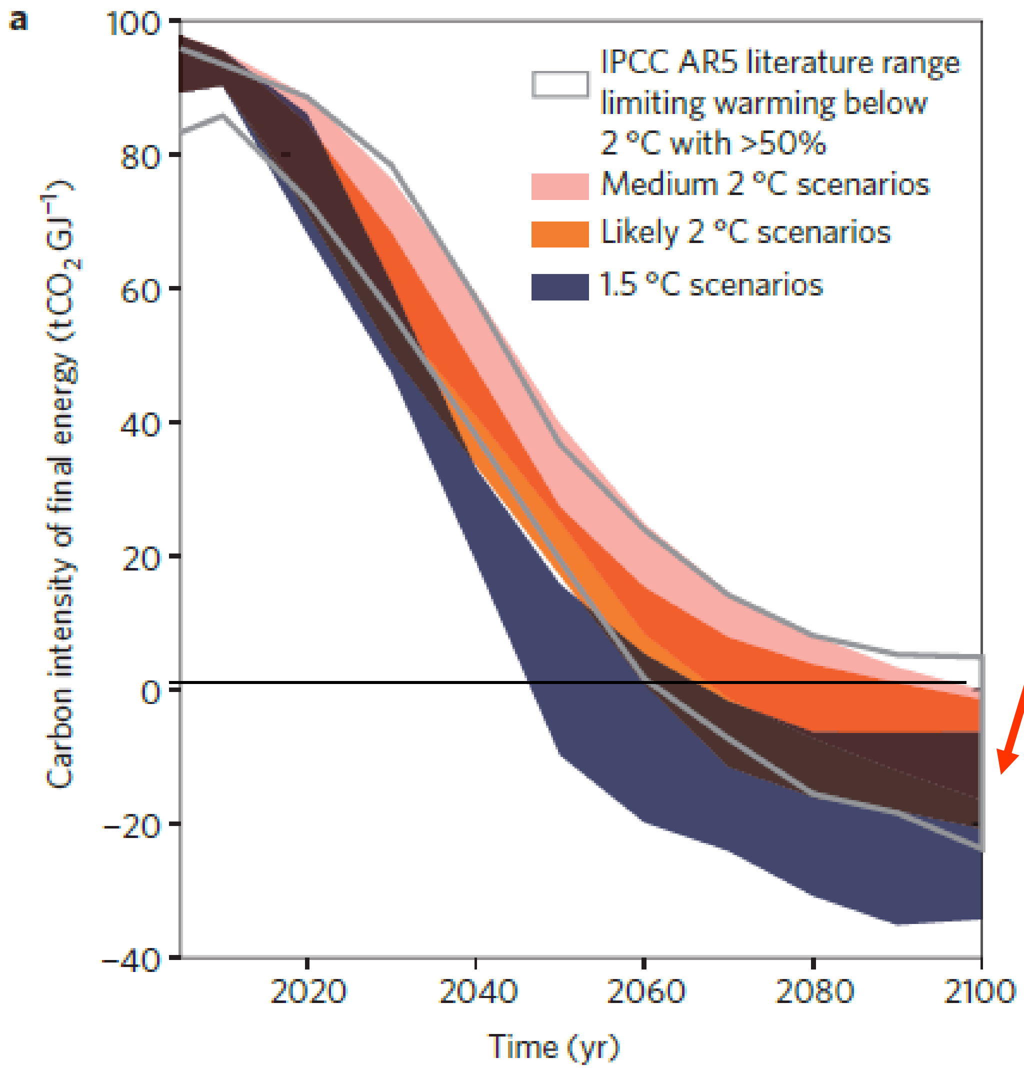
FSU, the former Soviet Union countries; CSA, Central and South America; ODA, Other developing Asian countries; OECD, the (
%, Reserves unburnable before 2050 as a percentage of current reserves.

Our results suggest that, globally, a third of oil reserves, half of gas reserves and over 80 per cent of current coal reserves should remain unused from 2010 to 2050 in order to meet the target of 2 °C.

Our results show that policy makers' instincts to exploit rapidly and completely their territorial fossil fuels are, in aggregate, inconsistent with their commitments to this temperature limit.

McGlade & Ekins, 2015

Carbon intensity of final energy: evolution until 2100 consistent with the < 2°C or < 1,5°C temperature target



We need net
negative emissions
from fossil fuel and industry from about 2050-2060

Example of negative emissions:

- biomass + carbon capture and storage;
- direct CO2 capture from air + storage

Rogelj J. et al. (2015) Energy system transformations for limiting end-of-century warming to below 1.5 °C. Nature Climate Change, 5, 519-528.

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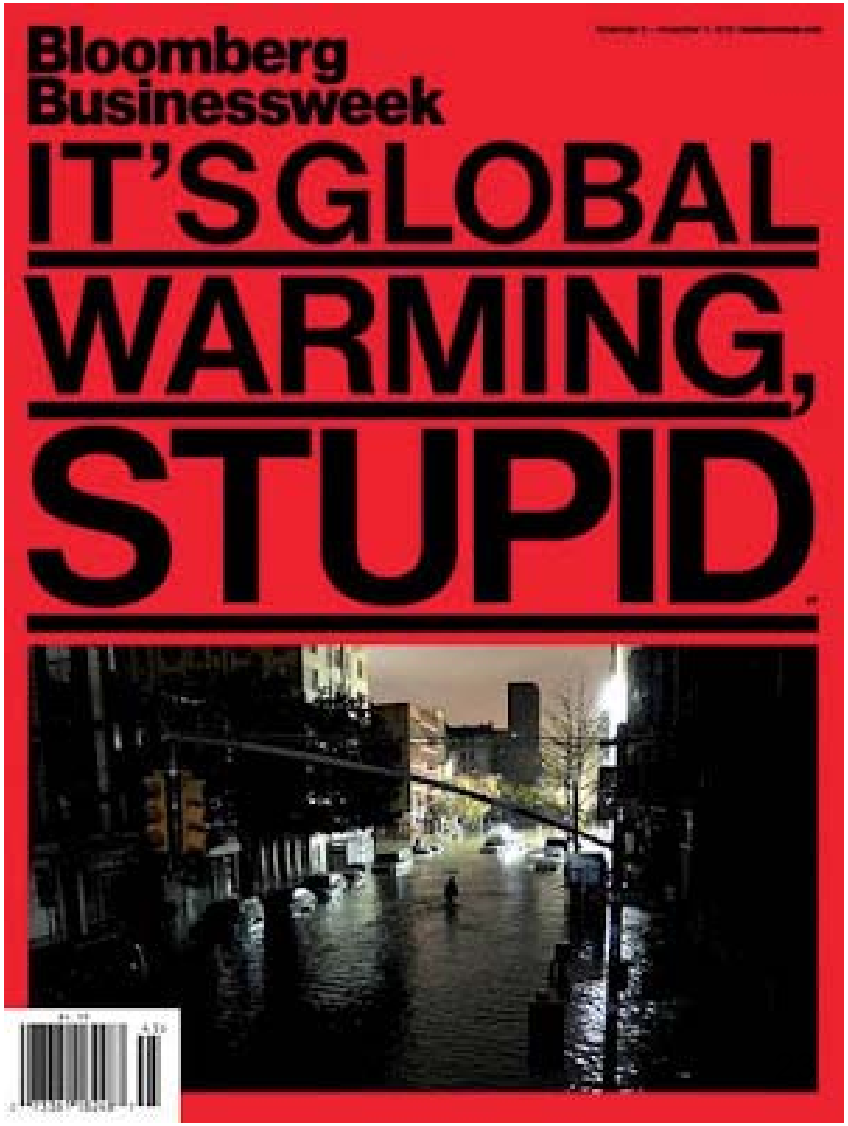
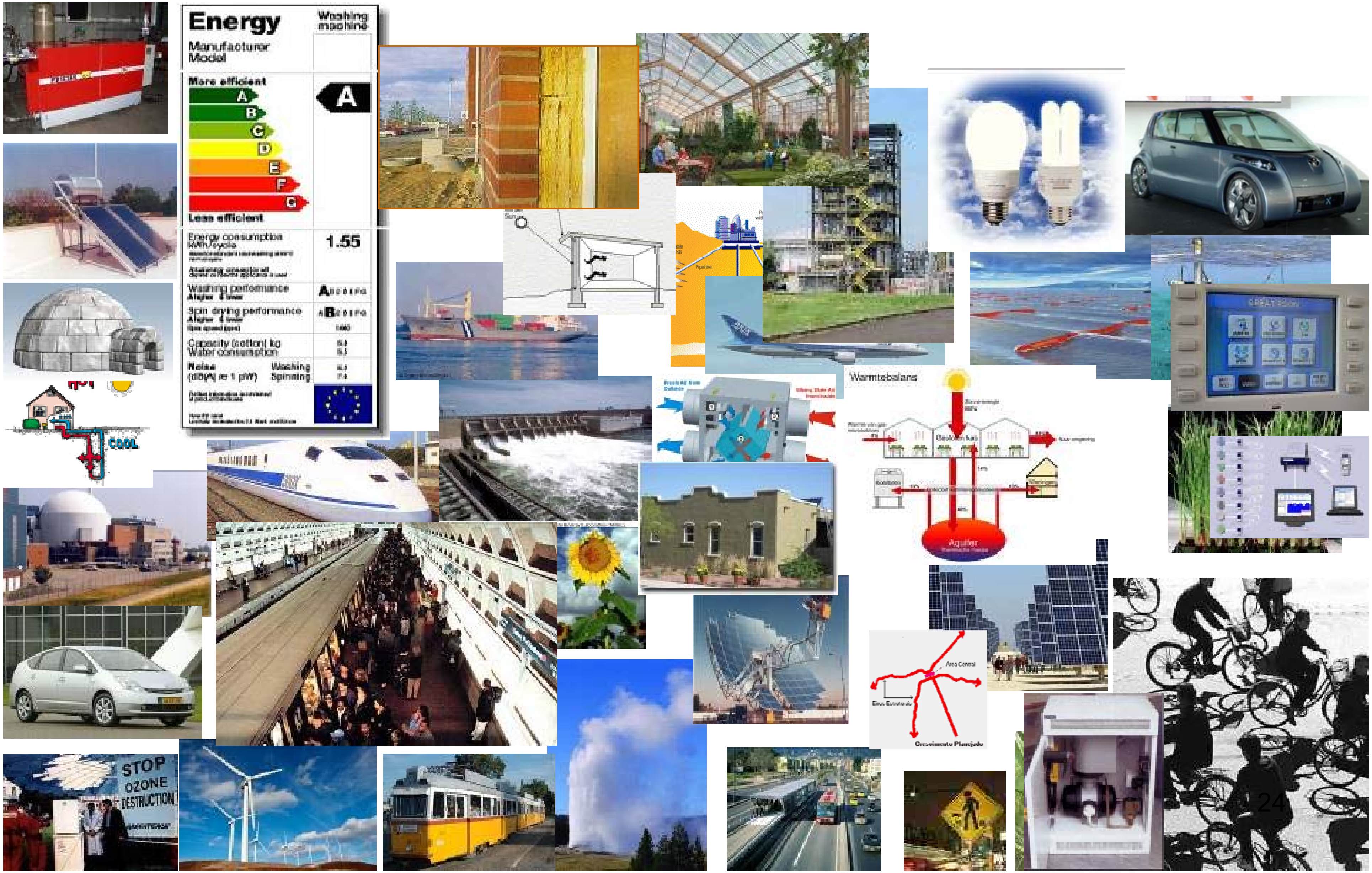
*"…**in the absence of efficient, large-scale capture and storage of airborne carbon**, carbon emissions that have already occurred or will occur in the near future result in a commitment to climate change that will be irreversible on timescales of centuries to millennia and longer".*

Some good news

It is increasingly clear that climate change is one of the biggest challenges facing the world

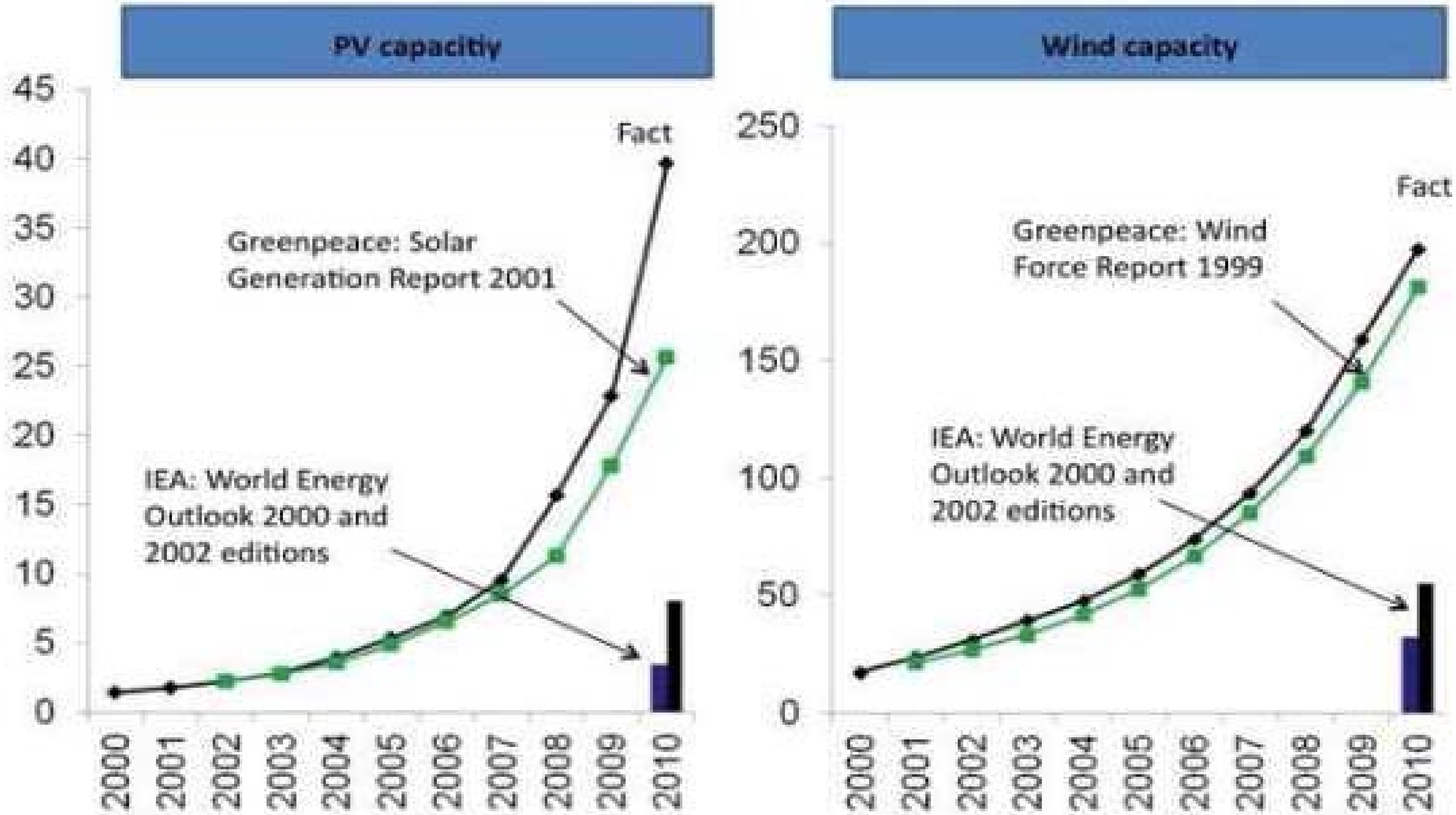


Many technologies and practices are available

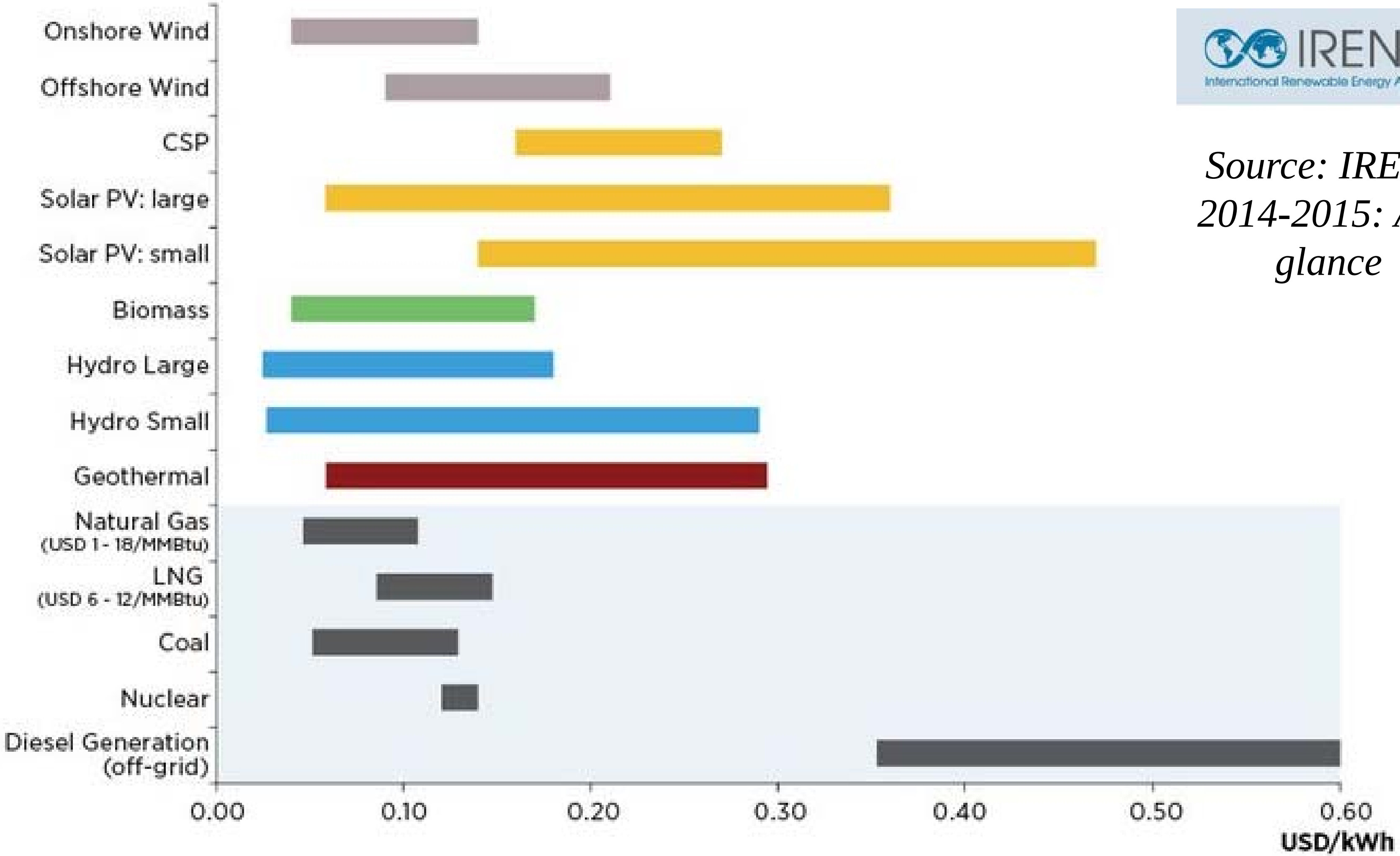


We receive from the Sun far more energy we need

Photovoltaic and wind energy increased in the last years more than expected by IEA (International Energy Agency) and even by Greenpeace



Costs of renewable energies are falling



IRENA
International Renewable Energy Agency

Source: IRENA 2014-2015: At a glance

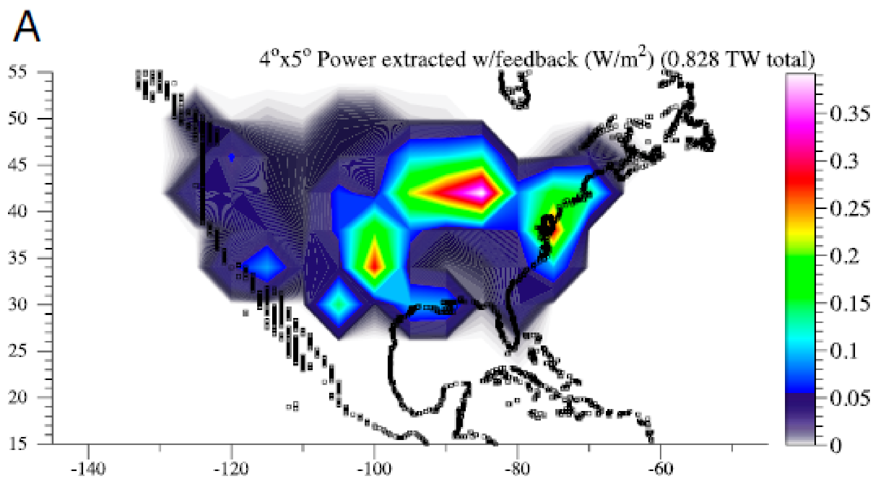
Many important studies consider feasible a 100% renewable energy system

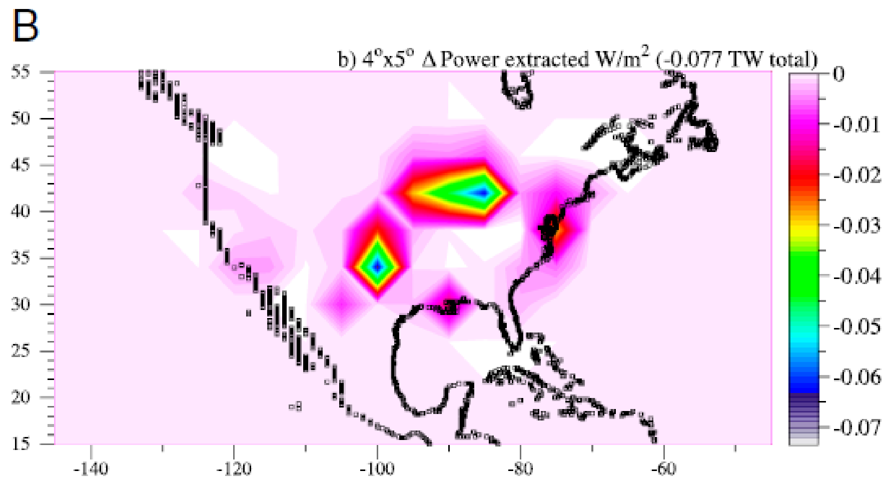
Low-cost solution to the grid reliability problem with 100% penetration of intermittent wind, water, and solar for all purposes

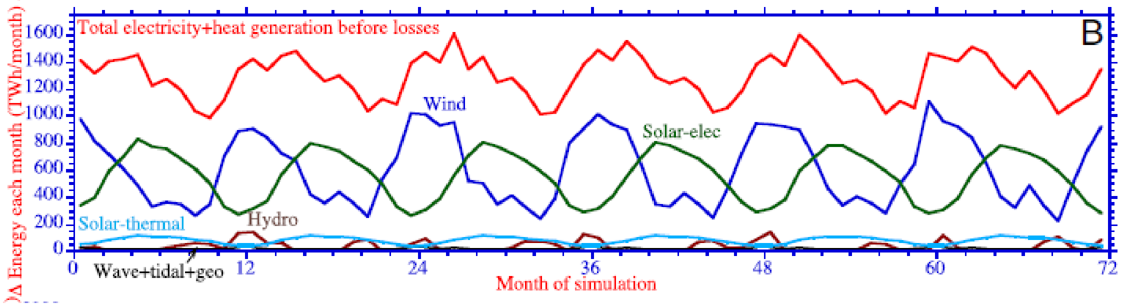
PNAS

Mark Z. Jacobson[a,1], Mark A. Delucchi[b], Mary A. Cameron[a], and Bethany A. Frew[a]

[a]Department of Civil and Environmental Engineering, Stanford University, Stanford, CA 94305; and [b]Institute of Transportation Studies, University of California, Berkeley, CA 94720







Even the EU Commission consider the need of changing lifestyles

Europe's climate change goals 'need profound lifestyle changes'

The Guardian, 15/2/2016

Leaked European commission document calls for wide-ranging debate on how to keep global warming to 1.5C

Mitigation and adaptation policies have many co-benefits

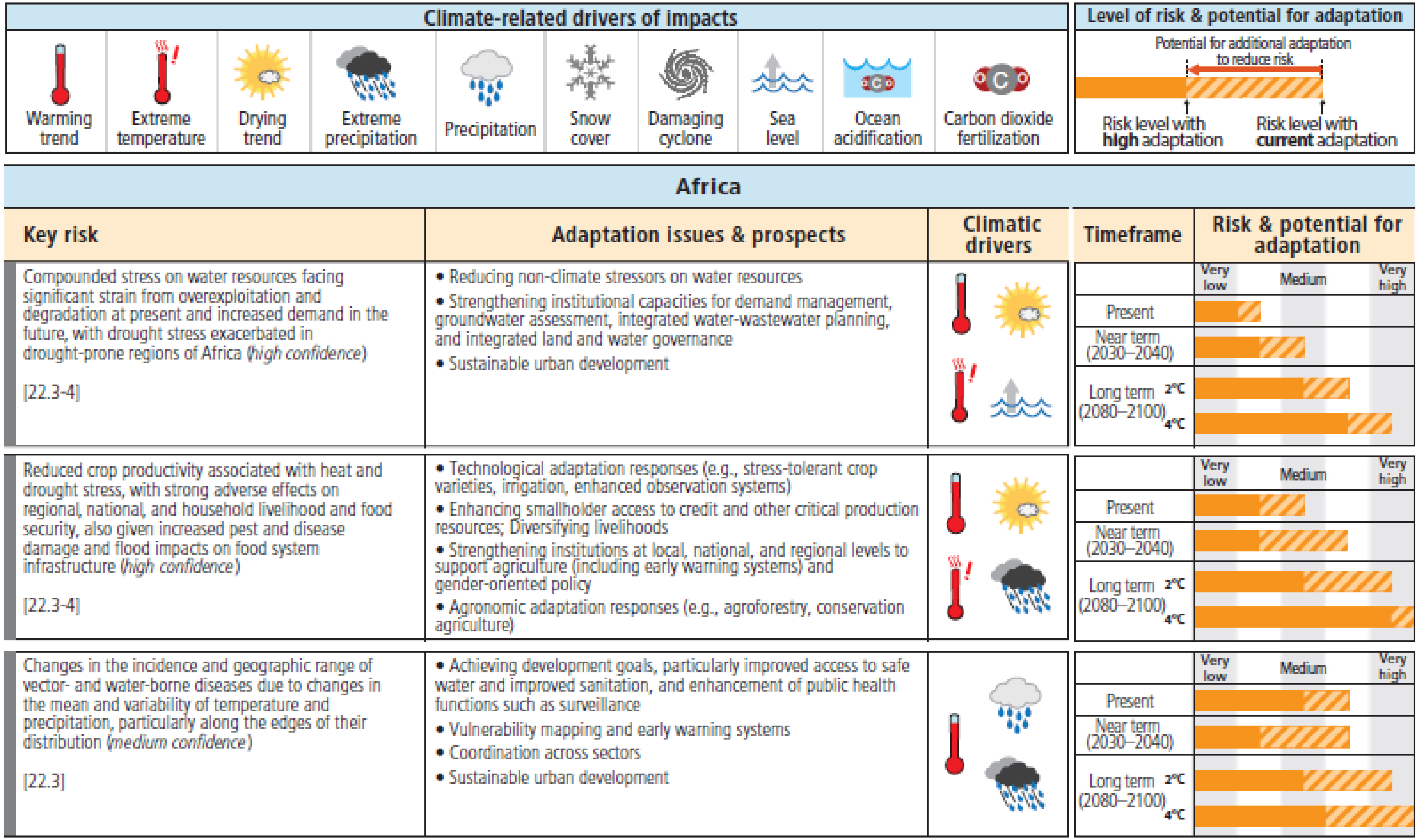
A good news is that many options with high potential offer immediate local co-benefits, especially in low-income countries, so that early action need not represent a trade-off with short-term development goals.

Mitigation can result in large co-benefits for human health and other societal goals.

Adaption should be integrated in development policies.

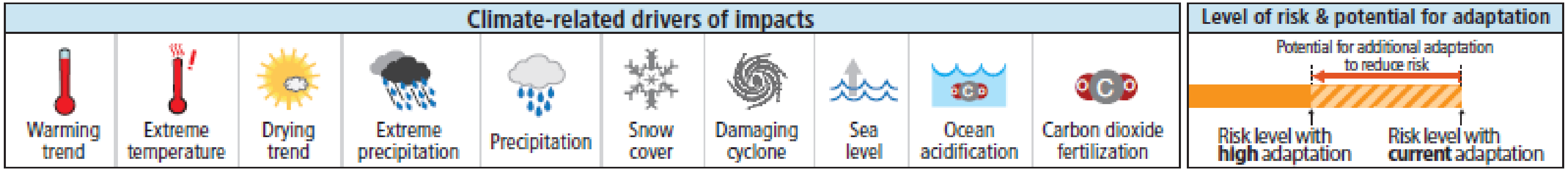
There is the potential for reducing risks through adaptation

Each key risk is characterized as very low to very high for three timeframes. In the near term, projected levels of global mean temperature increase do not diverge substantially for different emission scenarios. For the longer term, risk levels are presented for two scenarios of global mean temperature increase (2°C and 4°C above preindustrial levels).

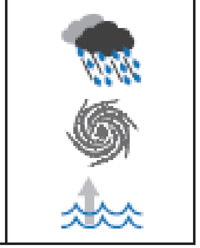
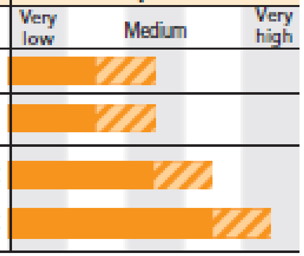
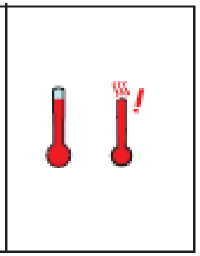
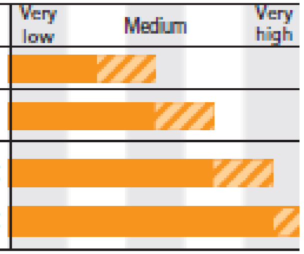
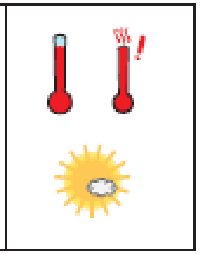
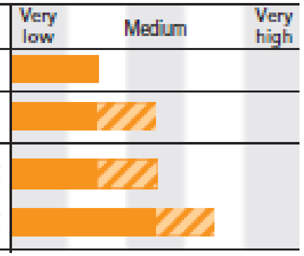


Key regional risks from climate change and the potential for reducing risks through adaptation and mitigation /2

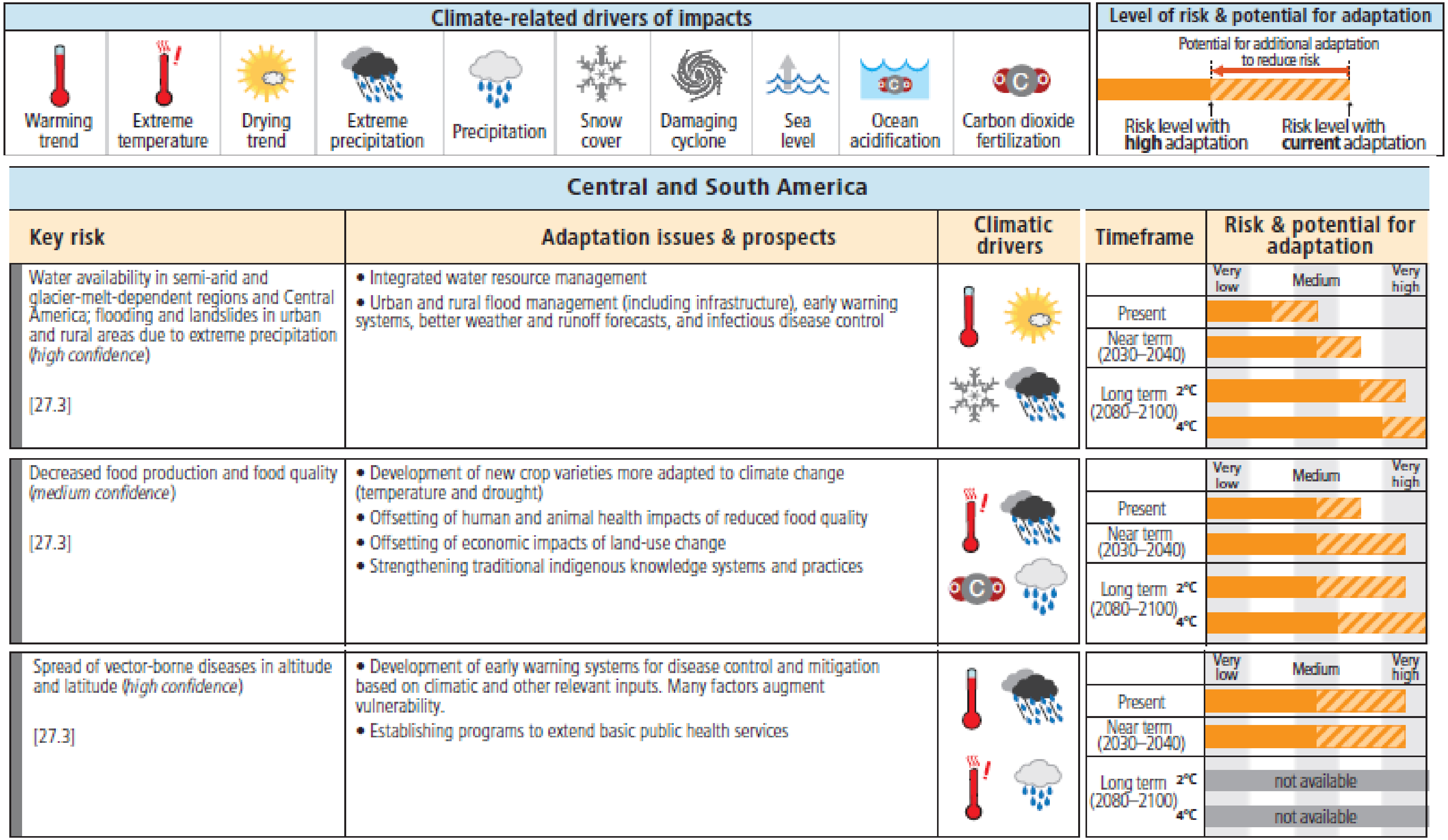
These scenarios illustrate the potential for mitigation and adaptation to reduce the risks related to climate change. Climate-related drivers of impacts are indicated by icons.



Asia

Key risk	Adaptation issues & prospects	Climatic drivers	Timeframe	Risk & potential for adaptation
Increased riverine, coastal, and urban flooding leading to widespread damage to infrastructure, livelihoods, and settlements in Asia (*medium confidence*) [24.4]	• Exposure reduction via structural and non-structural measures, effective land-use planning, and selective relocation • Reduction in the vulnerability of lifeline infrastructure and services (e.g., water, energy, waste management, food, biomass, mobility, local ecosystems, telecommunications) • Construction of monitoring and early warning systems; Measures to identify exposed areas, assist vulnerable areas and households, and diversify livelihoods • Economic diversification		Present Near term (2030–2040) Long term (2080–2100) 2°C / 4°C	
Increased risk of heat-related mortality (*high confidence*) [24.4]	• Heat health warning systems • Urban planning to reduce heat islands; Improvement of the built environment; Development of sustainable cities • New work practices to avoid heat stress among outdoor workers		Present Near term (2030–2040) Long term (2080–2100) 2°C / 4°C	
Increased risk of drought-related water and food shortage causing malnutrition (*high confidence*) [24.4]	• Disaster preparedness including early-warning systems and local coping strategies • Adaptive/integrated water resource management • Water infrastructure and reservoir development • Diversification of water sources including water re-use • More efficient use of water (e.g., improved agricultural practices, irrigation management, and resilient agriculture)		Present Near term (2030–2040) Long term (2080–2100) 2°C / 4°C	

Key regional risks from climate change and the potential for reducing risks through adaptation and mitigation /3



Figures for other regions:

https://ipcc-wg2.gov/AR5/images/uploads/WGII_AR5_BoxSPM-2Table1.zip

The Paris Agreement

PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

THE PARIS AGREEMENT

The outcome of UNFCCC COP 21 exceeded expectations, producing an agreement that while perhaps not a revolution, is an important step in the evolution of climate governance and a reaffirmation of environmental multilateralism.

Some call it "the world's greatest diplomatic success", while others insist it is "too weak" and full of "false hope".

There are well structured decisions on many crucial aspects

Mitigation
Adaptation
Loss and damage
Finance
Capacity Building
Transparency
Implementation

THE PARIS AGREEMENT

Objective of the Paris Agreement: to limit global temperature increase "*well below 2°C*" and to "*pursue efforts to limit the temperature increase to 1.5 °C*" .

Pursuing this objective requires a significant deviation from the policy trend of the last decades, characterized by lack of ambition, limits of scope and shameful delays.

Many decision makers at different administrative levels fail to acknowledge the consequences of the Agreement, the striking timing of the change that it requires.

THE PARIS AGREEMENT

Under the Paris Agreement, all 196 parties are obligated to put forward a target (called “*Intended Nationally Determined Contribution*”) and to report and assess their progress towards that target every five years.

The voluntary pledges proposed so far are not enough to reach the Objective of the Paris Agreement (“*well below 2°C*”); collectively they lead to a temperature increase of about 2,7-3.5°C

Legally binding or not?

The procedural aspects of the Paris Agreement are legally-binding.

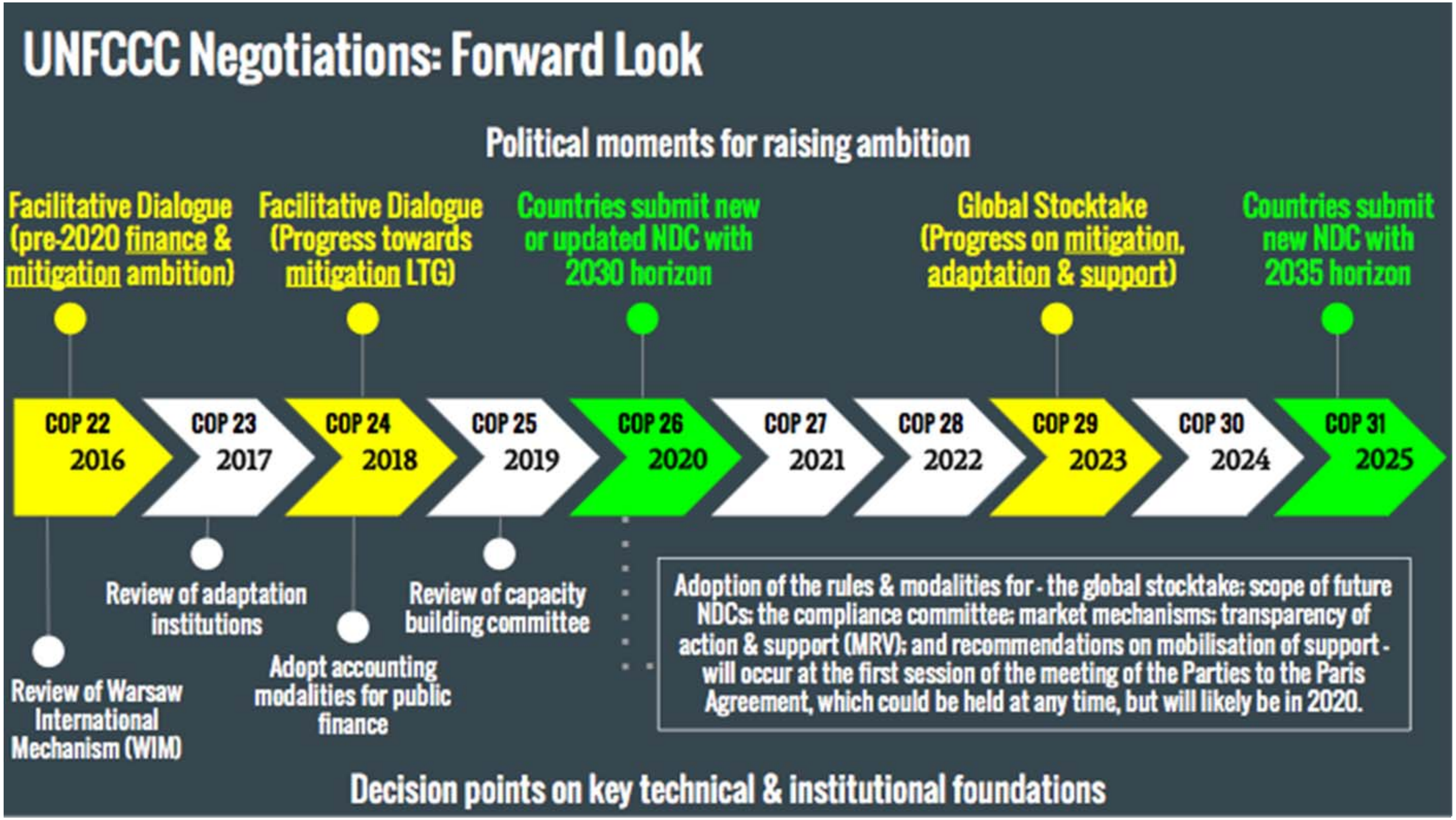
At the center of the Paris Agreement are five-year cycles: each INDC cycle is to be more ambitious than the last. These INDCs are not legally binding.

There are common rules for transparency and the compliance mechanism, although the compliance mechanism is currently “merely” facilitative in nature as it lacks an enforcement branch.

The success of the Paris Agreement relies on a system of ‘pledge and review’, and the power of shaming laggards. This puts much of the burden for holding countries accountable on civil society.

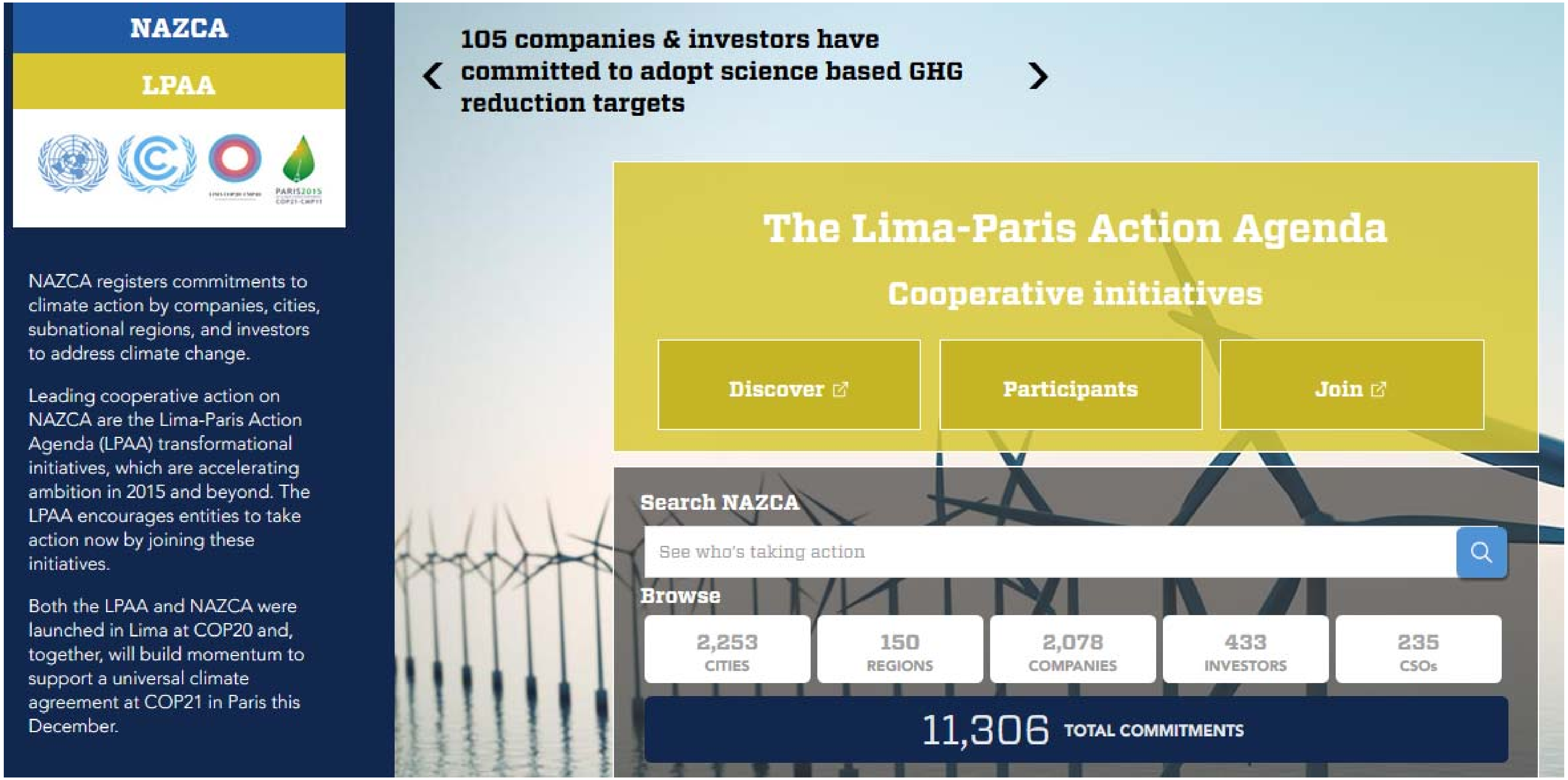
The Paris meeting created a pathway for success, but the Agreement itself cannot ensure it.

The Paris Agreement is a new beginning



COP21 was a catalyst for an extremely wide range of climate actors.

The Non-state Actor Zone for Climate Action



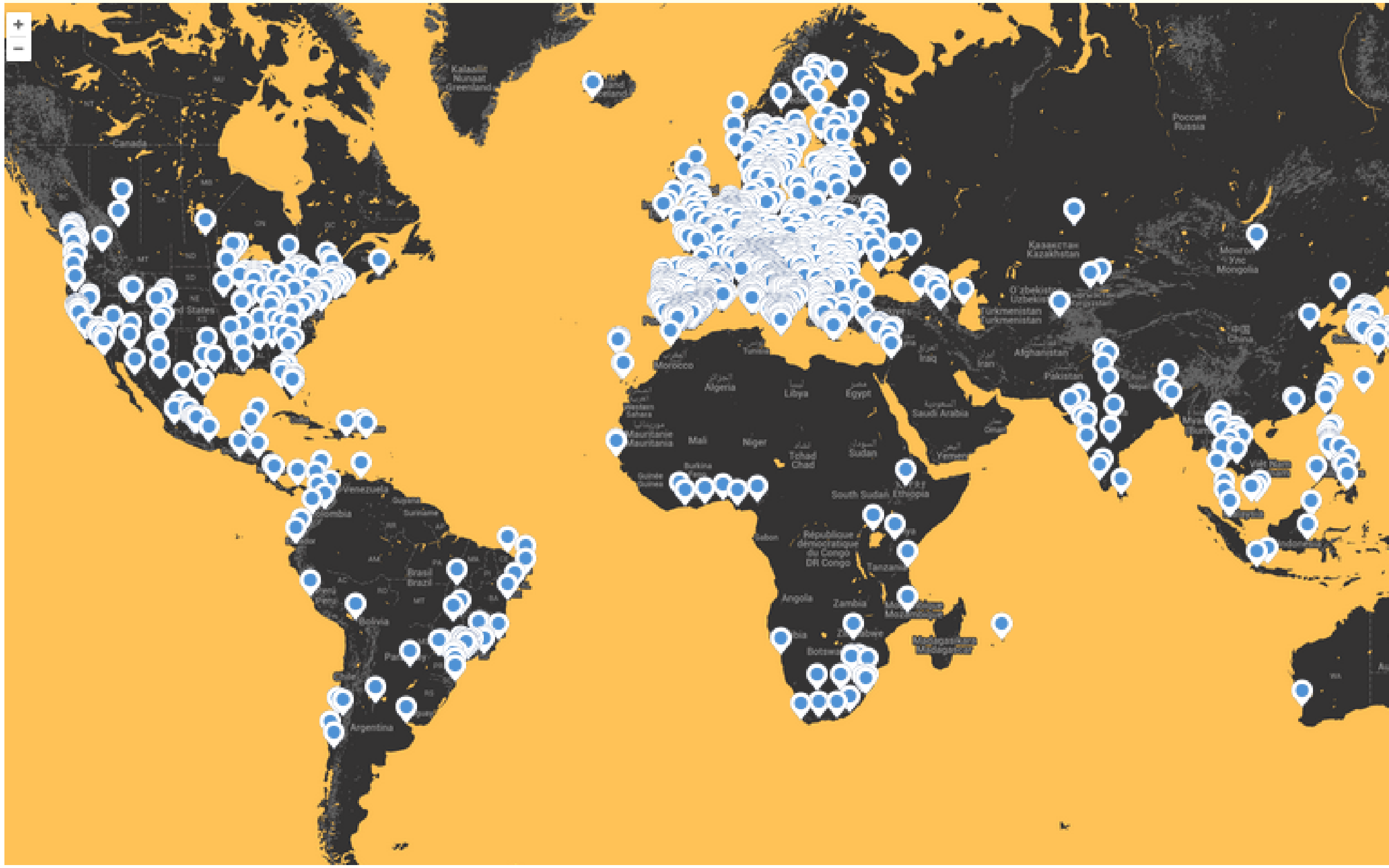
http://climateaction.unfccc.int/

Cities

Explore the map to see how cities are committing to action.

2253

Show filters



A Coruña Spain

Aachen Germany

Aalesund Norway

Abanto-Zierbena Spain

Abarán Spain

Abbiategrasso Italy

Aberdeen United Kingdom of Great Britain and Northern Ireland

Abidjan Côte d'Ivoire

Abrantes Portugal

Abrera Spain

Acate Italy

Accra Ghana

Aci Castello Italy

Acireale

Regions

Explore the map to see how subnational regions are committing to action.

150

Show filters

Aberdeenshire
United Kingdom of Great Britain and Northern Ireland

Aceh
Indonesia

Acre
Brazil

Aichi Prefecture
Japan

Akita
Japan

Alsace
France

Amapa
Brazil

Amazonas
Brazil

Amazonas
Peru

Aomori
Japan

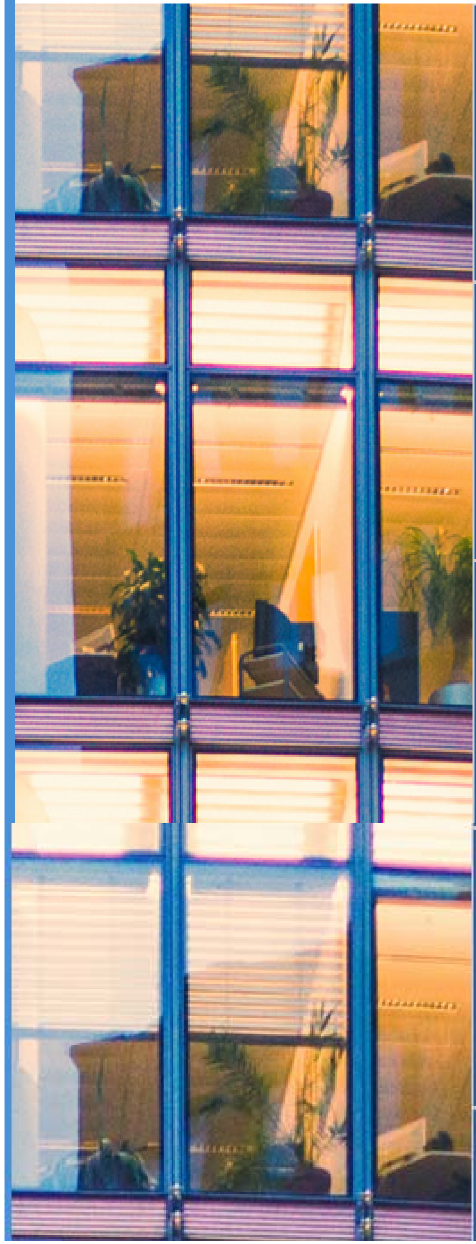
Aquitaine

Companies

2078

Select an industry group to see how companies are committing to action.

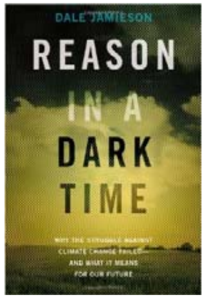
VIEW ALL



Industry group	Companies
Materials	291
Transportation	261
Capital Goods	208
Technology Hardware & Equipment	131
Utilities	130
Food, Beverage & Tobacco	129
Energy	118
Commercial & Professional Services	117
Automobiles & Components	86
Consumer Services	84
Consumer Durables & Apparel	79
Telecommunication Services	64
Household & Personal Products	
Retailing	
Food & Staples Retailing	

The road ahead: some principles

- In this fragmented and decentralized world no comprehensive doctrine or policy has a chance.
- Still it is important to plan ahead with an eye on the end goal
- There will be a «portfolio of policies without a portfolio manager».
- A lot could happen, although it may seem rather disorderly.
- Although countries at different levels of income and with different endowments will adopt different strategies, all have a role to play.
- We need to protect poor people and avoiding concentrated losses



The road ahead

The Paris Agreement rely on a "pledge and review" approach: thus it rests more on economic, social and political obligation, on reputation, than it does on legal authority.

The power of reputation relies substantially on public engagement, and states and institutions display varying degrees of 'commitment sensitivity'.

Whether the Paris Agreement will be able to drive the required rapid transition out of the fossil fuel system will depend not just on the legal architecture it establishes, but also on the vigour and sustained action of the people of the world expressing themselves in their economic and political behaviour as well as other areas of life.

This is the only sure path to making the objectives of the Paris Agreement a reality.

Stefano Caserini

stefano.caserini@polimi.it

www.climalteranti.it

www.caserinik.it

@caserinik